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A REPORT

ON THE

CEMENT MANUFACTORY

OF

F. O. NORTON,

AT BINNEWATER, ULSTER CO., N. Y.

ITS CAPACITY FOR
MAKING A CEMENT UNIFORM IN QUALITY,
IN LARGE QUANTITIES, OF GREAT FINENESS; AND RESULTS
OF TESTS MADE SHOWING ITS TENSILE AND
CRUSHING STRENGTH.

BY

Q. A. GILLMORE,

LIEUT.-COLONEL ENGINEERS; BREVET MAJOR-GENERAL U. S. A.

NEW-YORK, JANUARY, 1878.

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БИБЛІО
ГРУППА
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ENGINEER'S OFFICE, NEW-YORK,
January 10, 1878.

F. O. NORTON, Esq., NEW-YORK.

DEAR SIR: I have the honor to report as follows as the result of my examination, in September last, of your Rosendale Cement Manufactory, at Binnewater, Ulster County, New-York:

The *quarries* are located at about the central point of the region which produces the Rosendale Cement, and contain all the layers of cement-rock—an argillo-magnesian limestone—that have been found in Ulster County.

Your upper layers have an aggregate thickness of about thirteen feet, and the lower layers of about seventeen feet, separated from each other by the usual middle rock.

The cement-stone is found on your property for a distance of about 3,600 feet along the east side of the Wallkill Valley Railroad, and very near and parallel to it. The general direction of the outcrop is north and south. The southern portion of it, for a distance of nearly 2,000 feet, dips to the east, and the northern portion to the west.

2. B. 980.

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The quantity of cement-stone contained in your quarries east of the railroad is very large, and it is within easy and convenient reach, and may be quarried throughout its entire extent of 3,600 feet in length by 30 feet in thickness, equal to a face area of 108,000 superficial feet.

You have also a tract of ten acres west of the railroad, containing a bed of cement-stone quite convenient to your kilns.

Your *kilns*, eight in number, are of the usual Ulster County model. They are conveniently located with respect to the quarries, and are connected with them by a horse railroad, over which the stone is brought and delivered to the top of the kilns. The eight kilns are capable of burning from 650 to 675 barrels of cement daily. The burnt cement, after being drawn from the kilns, is conveyed by a car to the upper story of the "Mill," and there delivered to the crackers.

The *mill*, driven by ample steam power, contains twelve pairs of mill-stones, each three feet in diameter. One pair of these stones can grind from 65 to 70 barrels of cement of 300 lbs. each to that degree of fineness that 93 to 95 per cent. of it will pass through a fine wire sieve of fifty meshes to the lineal inch each way.

The productive capacity of your works is of course determined by the capacity of your eight kilns to burn the stone, inasmuch as the mill can always grind any unusually large burning, by running a little extra time.

It is usual to draw the kilns twice in twenty-four hours. If they are not drawn at all on Sundays, the productive capacity of your works during a season of the average duration of eight months is about 140,000 barrels of fine ground cement. By drawing the kilns on Sundays, as on other days, the productive capacity in a season would be about 162,000 barrels.

In order to reach the market, your cement is sent a distance of eight miles by the Wallkill Valley Railroad to Rondout, and is there shipped by steamers, sailing vessels, or canal-boats, as circumstances or its destination may render the most advantageous.

I found at your works that every necessary precaution is habitually taken to produce a cement of uniform quality throughout the season. This end is accomplished: *First*, by rejecting all stone of inferior quality at the quarry. There is no difficulty in doing this, as your quarrying is done by your own workmen, and not by contract. *Second*, by mixing together the stone from the several strata, when loading it into the small cars, which convey it to the kilns. *Third*, by mixing it together again when passing it into the kilns. *Fourth*, it is again mixed at the bottom of the kiln, and again in going into the crackers, and again in passing from the crackers to the mill-stones, and, finally, the ground cement receives a seventh mixing by being conveyed in bulk into a large reservoir, from which it is packed into barrels, each containing three hundred pounds.

It seems impossible for a cement manufactured under these conditions to differ in quality from week

to week and month to month, except very slightly from unavoidable variations in the degree of burning, due to changes in the force and direction of the prevailing winds, and other causes which affect the draft of the kilns.

TENSILE AND CRUSHING STRENGTH OF F. O. NORTON'S
ROSENDALE CEMENT.

The cement was mixed up with water to the consistency of mason's mortar, and in that condition was put into the moulds with a trowel. The specimens were left in the open air twenty-four hours after moulding, and were then immersed in fresh water and left there until the day they were tested, care being taken to keep the temperature of the water at 65 to 70 degrees Fahrenheit. The tensile strength was obtained with briquettes having a cross section of $1\frac{1}{2}$ inches by $1\frac{1}{2}$ inches equal to $2\frac{1}{4}$ square inches, and the crushing strength with 2-inch cubes, prepared by grinding down to exact cubes the ends of the broken briquettes. The results given below were obtained by dividing by $2\frac{1}{4}$ the average tensile and crushing strength respectively, obtained from a number of trials.

	Age of Specimen.	Crushing Strength per square inch.	Number of Trials.	Tensile Strength per square inch.	Number of Trials.
Neat Cement. }	Seven days.	546 lbs.	15	$104\frac{1}{3}$ lbs.	5
Neat Cement. }	Thirty days.	2,015 lbs.	15	134 lbs.	5
Cement, 1 Sand, 1	Thirty days.			102 lbs.	5

Your efforts to improve the quality of the high grades of Rosendale Cement appear to have been eminently successful.

In the year 1870 I selected samples of Rosendale Cement brought to the New-York market during one week in the month of August, and carefully tested specimens taken from cargoes belonging to five of the leading manufacturers. I tested the cement for tensile strength only, without sand, when seven days old, using the same method which I recently employed with yours. The best specimens gave sixty-five (65) pounds tensile strength per square inch. Your cement, tried under the same conditions, gave one hundred and four and one-third ($104\frac{1}{3}$) pounds. Whether those manufacturers have taken efficient measures to improve the quality of their cement since 1870, I am not informed. I know, however, from personal examinations that quite a large proportion of the Rosendale Cement brought to the New-York market is of very inferior quality, although sold at the prices fixed for the best.

Very respectfully, your obedient servant,

Q. A. GILLMORE,

Lieutenant-Colonel Engineers, Brevet Major-General U. S. A.



F. O. NORTON,

MANUFACTURER OF

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